

REMARKS

Claim 1-17 are pending in this application.

In the Office Action mailed December 19, 2003, claims 1-14 and 16-17 were rejected under 35 U.S.C. 103 as being unpatentable over Kashima et al. (U.S. patent 5,442,523) in view of EP 0724181. This rejection is traversed.

This present invention concerns a thermoplastic composite consisting essentially of a base thermoplastic layer; a diffusing layer placed on one or both sides of the base layer, constituted by a thermoplastic material containing barium sulphate in an amount by weight, expressed as % ratio on the total weight of the diffusing layer, of 0.01 – 2%,

Said composite, when lit on one or more edges, achieves an improved light intensity and improved light homogeneity on the panel.

Kashima discloses a backlighting device for liquid-crystal panels that illuminates transmissive or semi-transmissive panels from the rear side (col. 1, lines 6-8). The technical problem of Kashima was to improve the efficiency of power to luminance conversion (col. 1, lines 27-30).

From column 3, lines 4-7, of Kashima it is drawn that to impart light diffusing ability to the light conducting plate, a light diffusing material should be applied to part of the surface of said light conducting plate.

The therein exemplified light diffusing materials are paints, printing inks containing inorganic compounds among which barium sulphate, titanium dioxide, and other pigments (col. 3, lines 8-10).

When a light diffusing material is applied on the surface of the light conducting plate, Kashima teaches that said material is screen printed or otherwise printed in dots or strips on the surface of the light conducting plate.

Kashima uses the term "coverage" to define the proportion of light diffusing elements formed per unit area of the light conducting plate. See col. 11, lines 55-57. Kashima at col. 8, lines 11-15 indicates that the coverage of the light diffusing material applied over the surface of the light conducting plate could be for instance 6% at the point for a minimum value (on the side facing the cold cathode fluorescent tube) and 80% at the point for a maximum value, being the coverage gradually increased in the intermediate area. Kashima discloses also that the coverage with the circular pattern can be held constant at 6% over the entire surface of the plate, as described in col. 11, lines 52-54.

Therefore, in Kashima, there is no layer of diffusing material made of inorganic particles, but rather a series of dots, or strips, in order to have a partial coverage of the surface of the light conducting plate.

In fact according to Kashima the coverage as herein above defined must never be 100% per unit area of the light conducting plate. When a 100% coverage with the light diffusing material per unit area of said light conducting plate is obtained, and therefore it is formed a layer of light diffusing material covering the surface of the light conducting plate, thereof backlighting device produced a very uneven luminance distribution. See col. 12, lines 26-27 in combination with lines 30-31.

Therefore, according to the teachings of Kashima, the light diffusive material containing inorganic particles, to be operative, should not form a layer on the surface of the light conducting plate. In fact, in said conditions, as shown in col. 12, the light diffusive material does not afford to yield the results of the invention.

It is also noted that nowhere in Kashima is it stated that said light diffusing material containing inorganic particles forms a layer. In fact, in the backlighting device of said patent, the light diffusing plate is indicated as item (2) of Figs. 3 (b)

and 4 (b). See col. 4, lines 38-40. Said light diffusing plate (2) does not appear to contain inorganic particles.

According to Kashima, in the alternative to the light diffusing material placed on part of the light conducting plate surface, the light diffusing capability can also be provided by roughening the surface of the light conducting plate (col. 3, lines 22-24).

Also, in this case, no suggestion can be found to a thermoplastic light diffusing sheet containing inorganic material.

Considering the following main points from Kashima:

- that diffusion of light is obtained by applying paints, printing inks or pigments over the surface of the light conducting plate by screen printing a pattern of circular dots;
- that when it is obtained 100% surface coverage with said light diffusing material, light distribution is no more uniform;
- that said paints, printing inks or pigments act as diffusing material when they do not provide a full coverage of the surface of the light conducting plate;
- that said paints, printing inks or pigments have nothing to do with thermoplastic materials;

Those of skill in the art would not have drawn any hint to conceive that a thermoplastic layer containing from 0.01 to 2% wt of barium sulfate inorganic particles could solve the technical problem of the present invention.

Applicant also notes that it could not be drawn from Kashima that among barium sulphate and titanium oxide, that according to said patent are equivalent inorganic compounds for inclusion in said paints, printing inks or pigments, the former would perform much better than titanium oxide.

This is demonstrated in Table 1 on page 13 of the present specification, wherein the light intensity distribution for a diffusing thermoplastic plate containing 0.5% barium sulphate is reported, and in Table 8 on page 20 of the present specification for the light intensity of a diffusing thermoplastic plate containing 0.3% titanium oxide.

These Tables show that, at a distance of 15 cm from the light source, in the former case light intensity is of 67% as compared with 18% for the latter.

Therefore, the thermoplastic plate containing barium sulphate unexpectedly achieves, at that distance from the light source, a light intensity 270% higher than that of the plate with titanium oxide.

Therefore, in view of the above comments, Applicant respectfully submits that the presently claimed invention would not have been obvious over Kashima.

- The issue that Kashima et al. disclose a light conducting plate containing barium sulphate, since Figure 3(b) shows a light conducting plate (1) comprising a light diffusion layer (3) comprising light diffusing material (6) (page 5, para. 6 of the O.A.)

According to the Applicant, Figure 3(b) must be interpreted with reference to the specification.

The following is stated in Kashima for (3) and (6):

- (3) (the period bridging cols. 3-4): "specular or light diffusing/reflecting plate (Figs. 3(b) and 4(b)) is provided in such a way to cover substantially all of the face of the light conducting plate that has been provided with light diffusing capability".

- (6) (col. 3, lines 4-7): "To impart light diffusing ability to the light conducting plate, one may apply a light diffusing material 6 (Figs 3(b) and 4(b)) to part of the plate surface".

Therefore, the specular plate (3) and the light diffusing material are separate components of the composite.

It should be noted that the specular or light diffusing/reflecting plate is also cited in col. 2, lines 24-26.

As commented above, Kashima addresses to a light diffusing plate in connection with plate (2) of Figs. 3(b) and 4(b); said plate being used, if desired, in order to make undiscernible the dotted pattern of the light diffusing material (6). See col. 4, lines 38-41.

It is concluded that according to the Reference, the diffusing material applied to part of the conducting plate surface is not considered to be a plate diffusing light.

- Applicant respectfully submits that one of skill in the art would have not drawn from Kashima that an homogeneous light distribution could have been achieved by using a diffusive thermoplastic layer containing 0.01-2% barium sulphate.

As stated also by the Examiner in the previous Official Actions, Kashima does not state the quantity of the inorganic powder contained in the light diffusing material.

Applicant herein encloses a declaration signed by one of the inventors, Alberto Luca Stasi, wherein it is demonstrated that by using a thermoplastic PMMA layer containing 10% of barium sulphate in combination with a conducting layer, light intensity distribution on the surface of the diffusing layer was quite uneven and decreased very quickly from the light source (i.e., it was lower than 20% at a 15 cm distance from the light source).

This shows that the barium sulphate range of claim 1 of the invention is critical in order to achieve an improved light intensity and improved light homogeneity on the panel.

This result would not have been obvious in view of Kashima.

EP '181 discloses a light reflective sheet comprising a porous resin sheet and a protective layer laminated on at least one surface of the porous resin sheet. Applicant has already shown that this patent has nothing to do with the present invention.

In particular, the sheet identified in the EP as the light diffusion sheet is a polyethylene terephthalate sheet or a polyethylene terephthalate film whose surface is embossed. See page 11, lines 14-17, in combination with page 4, line 17. Therefore, the light diffusing sheet disclosed in the EP does not contain any inorganic filler.

Thus, for at least the above reasons, the presently claimed invention would not have been obvious over the applied combination of references. Reconsideration and withdrawal of the rejection of claims 1-14 and 16-17 under 35 U.S.C. § 103(a) are thus respectfully requested.

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event this paper is not being timely filed, Applicant respectfully petitions for an appropriate extension of time. Any additional fees may be charged to

Counsel's Deposit Account 01-2300, making reference to Attorney Docket No.
108907-09021.

Respectfully submitted,

A handwritten signature in black ink, reading "Robert K. Carpenter". The signature is fluid and cursive, with a horizontal line drawn underneath it.

Robert K. Carpenter
Registration No. 34,794

Customer No. 004372
ARENT FOX PLLC
1050 Connecticut Avenue, N.W.,
Suite 400
Washington, D.C. 20036-5339
Tel: (202) 857-6000
Fax: (202) 638-4810

RKC/tdd

Attachment: Declaration of Dr. A.L. Stasi Pursuant to 37 C.F.R. § 1.132